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**Title of the presentation**

Valorization of milk spectra: data mining of milk infrared spectra to assess transition success

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Session: Milk Analysis – New developments in using MIR Spectra

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## ABSTRACT

The transition period is recognized as a critical phase in cows' lactation. Poor transition can often be associated with clinical or subclinical diseases, but there is still a proportion of cows where poor transition cannot be linked to routinely measurable metabolites in milk. Also, millions of milk infrared spectra are generated in milk recording laboratories every year. These spectra contain comprehensive information about milk chemical composition. The objective of this study was to evaluate whether milk spectra can be mined in search for minor milk components that are not routinely measured in monthly milk samples and that might be potential biomarkers to assess transition success. First test day records within lactation and their corresponding spectra between 2015 and 2020 were extracted from Lactanet's database for Holstein cows in Québec, Canada. A categorical variable was created as a proxy for transition management based on the value of Transition Cow Index® (TCI). ANOVA–simultaneous component analysis+ (ASCA+) was used to test the effect of the TCI category on spectral variability. In the first round of analysis, spectra of samples collected during the first two weeks of lactation (N=238,773) had the highest variability attributed to the TCI category, which peaked on 8-11 DIM at 3.02%. This variability falls to 1.41% on week 4 of lactation. Spectral variabilities attributed to the other studied factors, namely DIM and parity (2, 3+), were <1% and <0.5%, respectively. The second round of analysis included 41,464 spectra of samples collected during the first two weeks of lactation. The results of the analysis revealed that low TCI category had direct correlation with spectral features of milk fat and protein and inverse correlation with those of lactose. In addition, direct relationship was observed between spectral features that can be attributed to milk fat, protein, creatine, phosphate, sulfur containing compounds and trans fatty acids.

These findings suggest that more frequent milk sampling is needed during the first two weeks of lactation and monitoring additional minor milk components might be useful in assessing transition success. To conclude, milk infrared spectra represent a rich source of information regarding the chemical composition of milk, and they can be mined to gain insights and detect trends to assess transition success in dairy cows. :


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